



RELATIVE NEUTRINO AND ANTINEUTRINO EVENT RATES
OF THE SINGLE HORN SYSTEM

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Computed relative neutrino and antineutrino event rates for the single horn system¹ are summarized as functions of horn excitation current and accelerator energy. Event rates for the double horn system which is no longer operable are also given for comparison. Table I gives relative neutrino event rates for 400 GeV and Table II for 300, 350, 375, and 400 GeV. Relative antineutrino event rates and wrong sign background rates are given in Table III for 350 and 400 GeV with and without an antineutrino plug. Cross sections for neutrinos and antineutrinos were assumed to be the same and proportional to the neutrino and antineutrino energy. The event rate ratio of neutrinos to antineutrinos of the single horn system is 0.42 for the horn excitation current of 140 kA and the accelerator energy of 400 GeV under the same conditions as in Table III. The Fermilab CDC-6600 computer NUADA program² was used with a momentum step of 10 GeV and a angle step of 1 mrad for no plug and of 0.5 mrad for with a plug. Stefanski-White's parametrization³ was used for particle production. The detector radius was assumed to be 1.35 m. The antineutrino plug had a radius of 1.4 cm, a length of 2.4 m, and an interaction length of 33 cm.

References

1. J. Grimson and S. Mori, New Single Horn System, TM-824, October 1978.
2. D. C. Carey and V. A. White, Fermilab Internal Report, NUADA, June, 1975.
3. R. J. Stefanski and H. B. White, Jr., FN-292, 2060.000, 1976.

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RELATIVE NEUTRINO EVENT RATES OF NEW SINGLE HORNAT 400 GEV

BEAM	NEUTRINO ENERGY RANGE (GEV)				
	0 TO 250	0 TO 50	50 TO 100	100 TO 150	150 TO 250
DOUBLE HORN	119	69	27	13	10
SINGLE HORN					
160 KA	100	49	27	12	11
140 KA	100	51	27	12	11
120 KA	98	52	25	12	9.7
100 KA	94	50	24	11	8.7
80 KA	86	47	21	10	7.6
60 KA	78	44	19	8.7	6.6
SINGLE HORN WITH PLUG					
140 KA	55	33	12	6.1	2.9
100 KA	43	29	8.5	4.5	1.7
80 KA	37	26	6.5	3.6	1.0
BARE TARGET	38	17	11	5.3	4.4

Table I.

RELATIVE NEUTRINO EVENT RATES OF SINGLE HORN SYSTEM
VS MACHINE ENERGY

Machine Energy (GeV)	Horn Current (kA)	Neutrino Energy Range (GeV)					
		To 250	To 50	To 100	To 150	To 250	
400	140	100	51	27	12	11	
	100	94	50	24	11	8.7	
	80	86	47	21	10	7.6	
375	140	89	47	23	10	8.5	
	100	83	47	20	9.4	7.0	
	80	77	44	18	8.6	6.1	
350	140	78	43	20	8.8	6.6	
	100	74	43	17	8.0	5.4	
	80	68	41	16	7.3	4.7	
300	140	58	35	13	6.0	3.6	
	100	55	35	12	5.3	3.0	
	80	51	33	11	4.8	2.5	
400	Double Horn	119	69	27	13	10	
	Bare Target	38	17	11	5.3	4.4	

Table II.

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* RELATIVE ANTINEUTRINO (WRONG SIGN BACKGROUND) EVENT RATES
OF SINGLE HORN SYSTEM VS MACHINE ENERGY

Plug	Machine Energy (GeV)	Horn Current (kA)	Antineutrino Energy Range (GeV)			
			0 To 200	0 To 50.	50 To 100	100 To 200
No Plug	400	140	100 (70)	70 (32)	23 (22)	6.8 (16)
		100	97 (71)	70 (32)	20 (23)	6.1 (16)
		80	91 (72)	67 (33)	18 (23)	5.5 (16)
	350	140	73 (46)	55 (24)	14 (13)	3.5 (10)
		100	71 (47)	56 (24)	12 (13)	3.2 (10)
		80	70 (47)	57 (24)	11 (13)	2.9 (10)
	400	Double Horn	145 (40)	108 (17)	30 (13)	7.3 (10)
	350	Double Horn	107 (29)	86 (14)	16 (9.0)	4.2 (6.3)
	Plug	140	61 (2.8)	48 (1.5)	10 (0.8)	3.2 (0.4)
		100	52 (3.4)	42 (1.7)	7.4 (1.2)	2.2 (0.5)
		80	47 (3.9)	40 (1.8)	5.9 (1.6)	1.7 (0.5)
		140	49 (2.2)	40 (1.3)	7.2 (0.6)	1.8 (0.3)
		100	42 (2.8)	36 (1.5)	5.4 (0.9)	1.3 (0.3)
		80	40 (3.2)	35 (1.6)	4.3 (1.2)	1.0 (0.3)
	400	Double Horn	52 (1.4)	43 (0.7)	6.7 (0.4)	1.9 (0.3)
	350	Double Horn	44 (1.1)	38 (0.6)	4.9 (0.3)	1.1 (0.3)

* Cross sections for neutrinos and antineutrinos were assumed to be same.

Table III.